DRAFT

ENGINEERING EVALUATION
CITY AND COUNTY OF SAN FRANCISCO PUC
PLANT NO. 14240
APPLICATION NO. 10927

BACKGROUND

City and County of San Francisco PUC is applying for an Authority to Construct and/or Permit to Operate for the following equipment:

S-2 Emergency Standby Generator Set: Diesel Engine; Make: Caterpillar; Model: 3516B; Rated Horsepower: 2847.5 HP

The standby generator will be used at 609 W. Orange Ave., South San Francisco, CA.

The genset will provide emergency power (in the event of a blackout) for all essential electricity power at the City and County of San Francisco PUC facility. This emergency engine must be periodically tested to ensure that they will generate when needed.

EMISSIONS SUMMARY

Annual Emissions:

The 2847.5 HP diesel engine at S-2 is CARB Certified and the emission factors are listed below.

Component	(g/bhp-hr)
NOx	6.190
CO	0.440
POC	0.150
PM_{10}	0.090
SO2*	0.184

**The emission factor for SO2 is from Chapter 3, Table 3.4-1 of the EPA Document AP-42, Compilation of Air Pollutant Emission Factors.*
SO_2 8.09E-3 (% S in fuel oil) lb/hp-hr = 8.09E-3 (0.05% S) (454 g/lb) = 0.184 g/hp-hr

Component		g/bhp-hr	hp	hr/yr	lb/g		lb/yr		TPY
NOx	=	6.190	2847.5	32	0.0022026	=	1242.34	=	0.6211693
CO	=	0.440	2847.5	32	0.0022026	=	88.3084	=	0.0441542
POC	=	0.150	2847.5	32	0.0022026	=	30.1051	=	0.0150526
PM10	=	0.090	2847.5	32	0.0022026	=	18.0631	=	0.0090315
SO2	=	0.184	2847.5	32	0.0022026	=	36.929	=	0.0184645

Maximum Daily Emissions:

A full 24-hour day will be assumed since no daily limits are imposed on intermittent and unexpected operations.

POLLUTANT		g/bhp-hr	hp	hr/day	lb/g		lb/day
NOx	=	6.170	1495	24	0.0022026	=	487.6107
CO	=	0.440	1495	24	0.0022026	=	34.77289
POC	=	0.150	1495	24	0.0022026	=	11.85439
PM10	=	0.090	1495	24	0.0022026	=	7.112636
SO2	=	0.184	1495	24	0.0022026	=	14.54139

Plant Cumulative Increase: (tons/year)

POLLUTANT	Existing	New	Total
NOx	0.876	0.621169	1.497169
CO	0.183	0.044154	0.227154
POC	0.073	0.015053	0.088053
PM10	0.055	0.009032	0.064032
SO2	0.018	0.018465	0.036465

Toxic Risk Screening:

The toxic emission of diesel particulate exceeds the District Risk Screening Trigger, as shown in Table (1) below, and a Risk Screening Analysis has been performed.

Table 1

Source	PM_{10} Emission Factor (g/bHP-hr)	HP	Annual Usage (Hours/year)	Diesel Exhaust Particulate Emissions (lb/year)	Trigger Level (lb/yr)	Risk Screen Required? (Yes/No)
2	0.09	2847.5	50	21	0.64	Yes

Results from the health risk screening analysis show that for 50 hours of operation per year when, excluding periods when operation is required due to emergency conditions, the maximum cancer risk is 15.3 in a million when the analysis was performed at a PM_{10} emission 28.249 lb/year. Thus, in accordance with the District's Toxic Risk Management Policy, the screen fails.

Since the applicant is wiling to accept a 32-hour limit on operations per year, excluding periods when operation is required due to emergency conditions, the maximum cancer risk is less than 10 in a million. This level of risk is acceptable under District's Toxic Risk Management Policy for operations that meet TBACT.

The ISCST3 air dispersion computer model was used to estimate annual average ambient air concentrations. Stack and building parameters for the analysis were based on information provided by the applicant. Estimates of residential risk assume continuous 70-year exposure to annual average TAC concentrations.

STATEMENT OF COMPLIANCE

S-2 will be operated as emergency standby engines and therefore are not subject to the emission rate limits in Regulation 9, Rule 8 ("NOx and CO from Stationary Internal Combustion Engines"). S-2 is subject to the monitoring and record keeping requirements of Regulation 9-8-530 and the SO2 limitations of 9-1-301 (ground-level concentration) and 9-1-304 (0.5% by weight in fuel). Regulation 9-8-530 requirements are incorporated into the proposed permit conditions. Compliance with Regulation 9-1 is expected since diesel fuel with a 0.05% by weight sulfur is mandated for use in California. Like all sources, S-2 is subject to Regulation 6 ("Particulate and Visible Emissions"). These engines are not expected to produce visible emissions or fallout in violation of this regulation and they will be assumed to be in compliance with Regulation 6 pending a regular inspection.

This diesel engine is subject to the Stationary Diesel Engine Air Toxics Control Measure (ATCM) and is considered a new stationary emergency standby diesel engine since it will be installed after January 1, 2005 and is larger than 50 HP. The requirements of the ATCM will be include in the permit conditions.

This application is considered to be ministerial under the District's proposed CEQA guidelines (Regulation 2-1-312) and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.

The project is within 1000 feet from the nearest school and therefore subject to the public notification requirements of Reg. 2-1-412.

Best Available Control Technology:

In accordance with Regulation 2, Rule 2, Section 301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NOx, CO, SO_2 or PM_{10}.

Based on the emission calculations above, the owner/operator of S-2 is subject to BACT for the following pollutants: NOx and CO. BACT 1 levels do not apply for ‘engines used exclusively for emergency use during involuntary loss of power’ as per Reference b, Document 96.1.2 of the BAAQMD BACT Guidelines for IC Engines. Hence, the owner/operator has to the meet BACT 2 limits presented below.

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
NOx	1. *1.5 g/bhp-hr [107 ppmvd @ 15% O_2] a,b* 2. *6.9 g/bhp-hr [490 ppmvd @ 15% O_2] a,b,c* 3. *6.9 g/bhp-hr [490 ppmvd @ 15 % O_2]*	1. *Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler a,b* 2. *Timing Retard $\leq 4^o$ + Turbocharger w/ Intercooler a,b,c* 3. *Timing Retard $\leq 4^o$ + Turbocharger w/ Intercooler*
CO	1. *n/s* 2. 2.75 *g/bhp-hr [319 ppmvd @ 15% O2] b,c*	1. *Catalytic Oxidation b* 2. *CARB or EPA (or equivalent) low-CO emitting certified engine b,c*

For NOx, and CO, the emission limits set by BACT 2 are met, as shown in Table (2) below.

Table (2)

Pollutant	Engine Emission Factors with Catalyst (g/hp-hr)	Emission Factor Limits as set by BACT 2 (g/hp-hr)	Have the limits been met?
NOx	6.17	6.9	YES
CO	0.44	2.75	YES

Therefore, S-2 is determined to be in compliance with the BACT 2 limits for NOx and CO.

Since CARB certification data was used to establish the NOx and CO emission factors, the BACT 2 emission limits have not been incorporated into the permit conditions and are assumed to be complied with through the design standards demonstrated by the CARB certification testing.

Offsets: Offsets must be provided for any new or modified source at a facility that emits more than 15 tons/yr of POC or NOx. Based on the emission calculations above, offsets are not required for this application.

PSD, NSPS, and NESHAPS do not apply.

PERMIT CONDITIONS

Application 010927; City and County of San Francisco PUC; Plant 14240; Conditions for S-2 Emergency Diesel Generator:

PC #22108

1. The owner/operator of emergency generator S-2 shall use only diesel fuel having a sulfur content no greater than 0.05% by weight. The sulfur content of the fuel oil shall be certified by the fuel oil vendor.
   (Basis: Cumulative Increase)

2. The owner/operator of S-2 shall only operate this engine to mitigate emergency conditions or for reliability-related activities. Operation for reliability-related activities shall not exceed 32 hours in any calendar year. Operation while mitigating emergency conditions is unlimited.
   (Basis: Regulation 9-8-330, Cumulative Increase)

3. "Emergency Conditions" is defined as any of the following:
   (Basis: Regulation 9-8-231)
   a. Loss of regular natural gas supply
   b. Failure of regular electric power supply
   c. Flood mitigation
   d. Sewage overflow mitigation
   e. Fire
   f. Failure of a primary motor, but only for such time as needed to repair or replace the primary motor

4. "Reliability-related activities" is defined as any of the following:
   (Basis: Regulation 9-8-232)
   a. Operation of an emergency standby engine to test its ability to perform for an emergency use, or
   b. Operation of an emergency standby engine during maintenance of a primary motor

5. The owner/operator of S-2 shall provide this engine with either:
   (Basis: Regulation 9-8-530)
   a. a non-resettable totalizing meter that measures and records the hours of operation for the engine; or
   b. a non-resettable fuel usage meter, the maximum hourly fuel rate shall be used to convert fuel usage to hours of operation.

6. The owner/operator of S-2 shall maintain the following monthly records. These records shall be kept in a District-approved log for at least 2 years and shall be made available for District inspection upon request:

(Basis: Regulations 9-8-530, 1-441)
a. Total hours of operation
b. Hours of operation under emergency conditions and a description of the nature of each emergency condition
c. Fuel usage

RECOMMENDATION

Issue an Authority to Construct to City and County of San Francisco PUC for the following source:

S-2 Emergency Standby Generator Set: Diesel Engine; Make: Caterpillar; Model: 3516B; Rated Horsepower: 2847.5 HP

EXEMPTIONS
None.

By:_____ Date:_____
Myoung William Chung
Air Quality Engineering Intern